Deposition of Atmospheric Reactive Nitrogen in the U.S. Rocky Mountain Region

Jeffrey Collett (1), Katherine Benedict (1), Evie Bangs (1), Yi Li (1,2), Anthony Prenni (3), and Bret Schichtel (3)

(1) Colorado State University, Atmospheric Science, Fort Collins, CO, United States (collett@colostate.edu), (2) Sunset-CES, Inc., Portland, OR, United States, (3) Air Resources Division, National Park Service, Denver, CO, United States

Deposition of reactive nitrogen deposition is a growing concern in the U.S. Rocky Mountain west. Alpine ecosystems in Rocky Mountain National Park (RMNP), Grand Teton National Park (GTNP) and elsewhere evolved under low nitrogen conditions. Increases in inputs of oxidized and reduced nitrogen in recent decades have created new stresses on these ecosystems. While deposition of oxidized nitrogen is decreasing across much of the United States due to NO_x emissions controls, deposition of ammonium has increased in many regions. Current inputs of reactive nitrogen in the Rocky Mountain region substantially exceed established critical loads. For the past decade we have been actively examining the sources, transport and deposition of reactive nitrogen in this region. Both RMNP and GTNP are located at high elevation, but experience periodic, polluted conditions associated with transport of emissions from a variety of regional sources, including urban areas, power plants, agricultural regions, wildfires, and areas of active oil and gas development. Although wet deposition of nitrate and ammonium, on which the critical loads for nitrogen deposition are based, are important, our measurements reveal that dry deposition of gaseous ammonia and wet deposition of organic nitrogen are also both major contributors to regional reactive nitrogen deposition budgets. National ammonia monitoring began only recently while we still lack routine measurement of wet organic nitrogen deposition.